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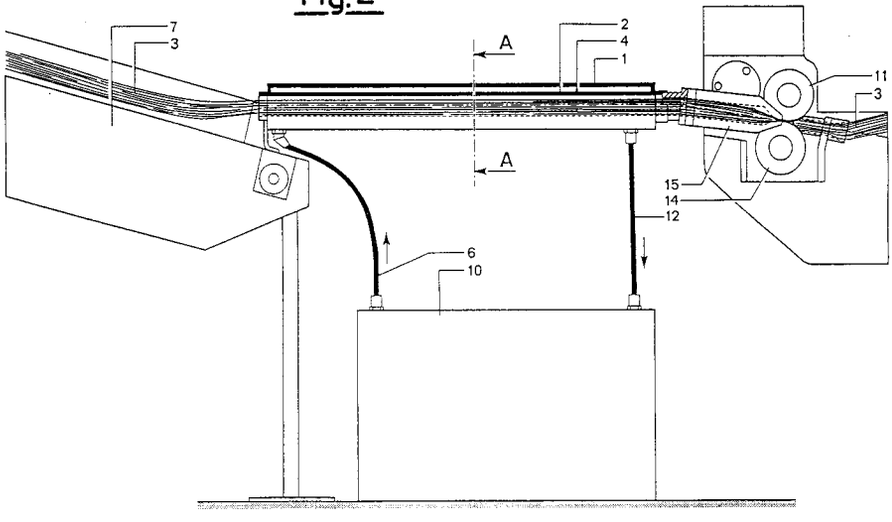
(54) Method for stabilizing the degree of retraction of an artificial fibre sliver leaving a stretch-breaking machine.

(57) This invention relates to a method for stabilizing the degree of retraction of an artificial fibre sliver (3) leaving a stretch-breaking machine (5), the method comprising energetic cooling of the sliver along a duct (1,2) cooled externally by a liquid or gaseous fluid, the cooling action occurring along a section of the path between the crimping chamber (15) and the distributor member (8) positioned above the collection can (9).

Fig.2



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This invention relates to a method for stabilizing the degree of retraction of an artificial fibre sliver by energetic cooling action along a duct extending along a section of the path between the crimping chamber and the distributor member above the collection can.

In the textile industry the sequence of operations by which continuous artificial or synthetic filament sliver (TOW) is converted into discontinuous fibre sliver (TOP) is well known.

Tow-to-top conversion by the stretch-breaking method is also known. The principle of operation of a stretch-breaking machine is based on non-localized stretch-breaking of the tow by tension.

The operation of stretch-breaking machines has also been known for some time in the textile processing of continuous filament fibres.

In contrast to cutting, the stretch-breaking process modifies the physical characteristics of the fibre. The filament, which is elongated until breakage, becomes transformed in its internal structure. The fibres leaving the exit unit are of finer count and higher ultimate tensile stress than those entering. In addition they have a lower ultimate elongation. These modifications in the fibre characteristics are not completely stable. With regard to the elongation undergone, it is observed that if the sliver is heated to 100 °C, there is a sudden shortening of the fibres, which tend towards reacquiring their original length, but without totally succeeding. For this reason, and to prevent unpleasant surprises during subsequent processing, the sliver leaving the stretch-breaking machine is usually steam-treated in the known art. This process, known as stabilization, fixing or retraction, produces a fixed, stabilized or retracted sliver.

The fixed sliver is characterised by high dimensional stability of its constituent fibres.

This exposure to saturated steam, and in particular to superheated steam, for the thermal treatment of the sliver requires a series of additional processes which are not easy to implement and not always satisfactory in terms of quality and treatment uniformity.

In other words, implementing the steam exposure process for stabilizing the fibre sliver requires apparatus with a sealed and properly insulated treatment chamber to prevent steam leakage and heat dispersion into the surrounding air, which would reduce the temperature in the treatment chamber and hence represent an unnecessary energy loss, consequently limiting the efficiency of the installation. In addition, a steam generator is required able to produce pure steam and ensure its presence within the treatment chamber, such a steam generator not being always of simple operation. Although certain apparatus have been considered in the past for thermal steam treatment of the sliver leaving the stretch-breaking machine, they are not of simple construction, they require considerable installation space and are difficult to install between the crimping chamber and the swinging deposition member.

The object of the present invention is to provide a method for stabilizing the degree of retraction of an artificial fibre sliver leaving a stretch-breaking machine which is able to overcome the aforesaid drawbacks.

This object is attained according to the invention by a method consisting of cooling the sliver along a section of the path between the crimping chamber, positioned immediately downstream of the drafting unit, and the swinging member which deposits and distributes the sliver in the collection can.

In the method of the invention the cooling of the sliver takes place along a duct cooled externally by a fluid which enters at one end and leaves at the other end of the duct. There are thus two virtually concentric ducts, one internal, through which the sliver passes, and the other external, through which the cooling fluid flows.

Further in the method of the invention, the cooling fluid enters at the end at which the sliver leaves, and leaves at the end at which the sliver enters, said cooling fluid being a liquid or gaseous fluid, preferably water, cooled by a heat-transfer refrigeration unit of known type.

A preferred embodiment of the invention is described hereinafter by way of non-limiting example with reference to the accompanying drawings, in which:

Figure 1 is a perspective schematic overall view of the apparatus for implementing the method of the present invention, the view also showing the end of the stretch-breaking machine from which the fibre sliver emerges for feeding to the crimping chamber, and the collection can above which the swinging member for its deposition and distribution lies;

Figure 2 is a partly sectional side schematic view of the sliver cooling duct positioned immediately downstream of the drafting unit and crimping chamber, this view also showing an underlying refrigeration unit which continuously generates and regenerates the cooling fluid;

Figure 3 is a schematic section on the line A-A of Figure 2, this frontal section showing two concentric ducts, one within the other, the fibre sliver passing through the space within the inner duct and the cooling fluid passing through the annular space circumscribed by the outer duct.

In the figures corresponding parts carry the same reference characters for simplicity.

The stretch-breaking machine, or a similar textile machine, and the mechanisms which operate in

mutual cooperation with the apparatus implementing the method of the invention are not shown overall nor is their operation described as they are already known and are not involved in the operation of the invention.

In the accompanying drawings:
3 is the artificial fibre sliver leaving the stretch-breaking machine 5. Said sliver 5 is conveyed by the drafting rollers 11 and 14, which cause it to enter the crimping chamber 15 which give it a certain compactness, ie it returns the crimping to it which was lost during the stretch-breaking; from the exit of the crimping chamber it enters the duct 2 of quadrangular shape. This quadrangular shape is not binding for the duct 2, which constructionally could have any polygonal or substantially circumferential shape. The fibre sliver 3 travels axially within the duct 2 to be energetically cooled by the cooling fluid passing through the annular space 4 defined between the two substantially concentric ducts 1 and 2. The annular space 4 between the two ducts 1 and 2 must be of perfectly sealed construction, ie it must not allow the cooling fluid from the underlying refrigeration unit 10 to leak out.

By heat transfer of the known art the refrigeration unit 10 generates the cooling fluid, which is pumped through the hose 6 into the annular space 4 about that end of the duct 2 from which the fibre sliver 3 leaves. The pumping action forces the cooling fluid axially along the annular space 4 so that during its axial passage it extracts heat from the fibre sliver 3 to cool it in order to stabilize it in the most suitable manner for its subsequent processing. The cooling fluid travels axially through the space 4 in the opposite direction to that in which the sliver 3 passes through the duct 2. On reaching the end at which the sliver enters the duct 2, the cooling fluid, the temperature of which has risen, passes through the hose 12 and into the refrigeration unit 10 in order to be regenerated before being again pumped through the hose 6 as cooling fluid for the fibre sliver 3.

On leaving the duct 2, the sliver 3 because of the cooling action to which it has been subjected has its constituent fibres of high dimensional stability and is therefore in an ideal state for collection in the collection can 9 by the action of the conveyor belt 7 and the distributor member 8 of known type.

The described embodiment of the invention is given by way of non-limiting example only. Modifications and additions can be made to the apparatus by the expert of the art but without leaving the general idea underlying the method of the present invention.

Claims

1. A method for stabilizing the degree of retraction of artificial fibre sliver leaving a stretch-breaking machine, characterised by cooling the sliver along a section of the path between the crimping chamber, positioned immediately downstream of the drafting unit, and the swinging member which deposits and distributes the sliver in the collection can.

2. A method for stabilizing the degree of retraction of an artificial fibre sliver as claimed in claim 1, characterised in that the cooling of the sliver takes place along a duct cooled externally by a fluid which enters at one end and leaves at the other end of the duct.

3. A method for stabilizing the degree of retraction of an artificial fibre sliver as claimed in claims 1 and 2, cbaracterised in that there are two substantially concentric ducts, one internal through which the sliver passes, the other external through which the cooling fluid flows.

4. A method for stabilizing the degree of retraction of an artificial fibre sliver as claimed in claims 1 to 3, characterised in that the cooling fluid enters at the end at which the sliver leaves, and leaves at the end at which the sliver enters.

5. A method for stabilizing the degree of retraction of an artificial fibre sliver as claimed in claims 1 and 2, characterised in that the cooling fluid is a liquid or gaseous fluid, preferably water, cooled by a heat-transfer refrigeration unit of known type.

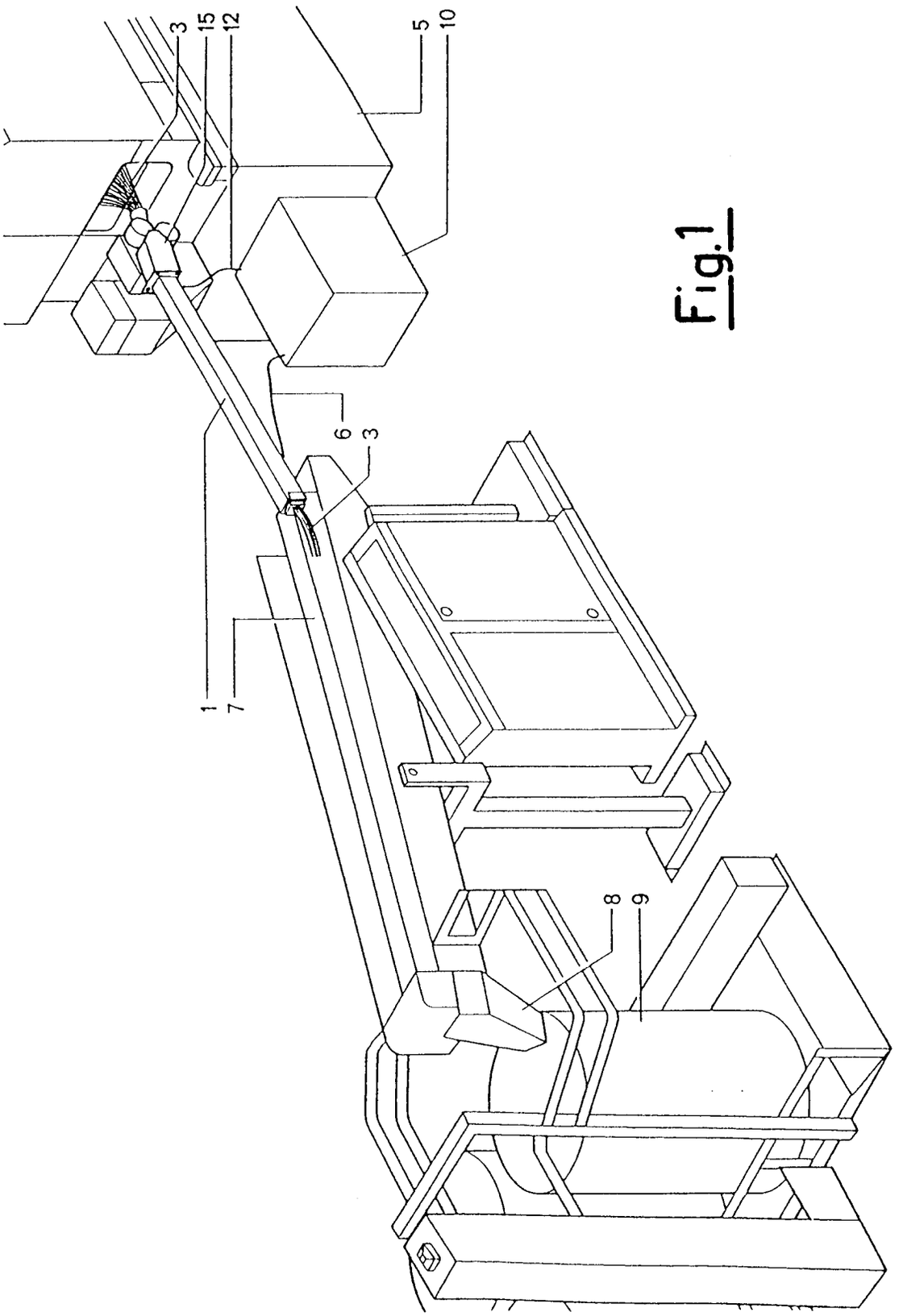


Fig.1

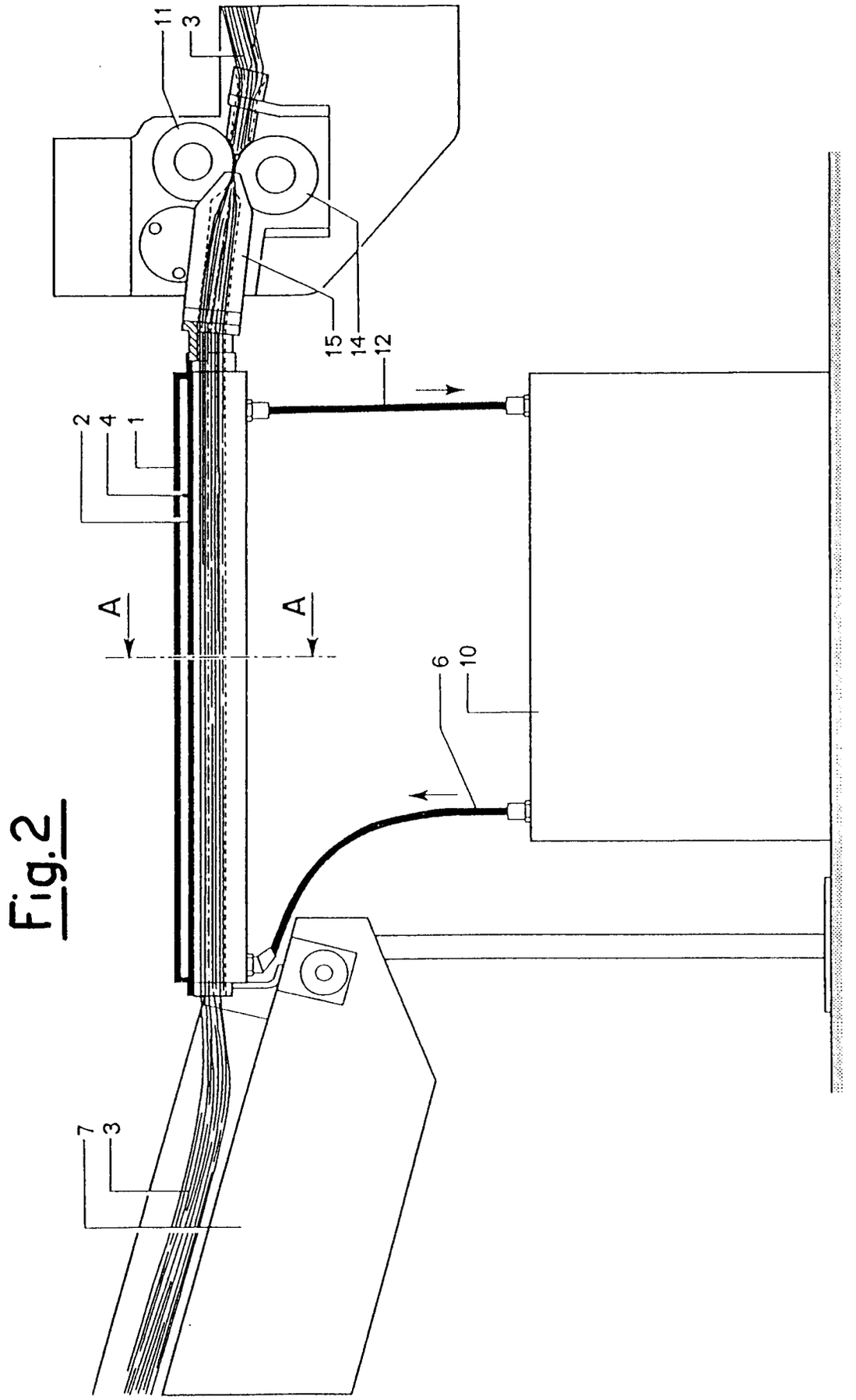
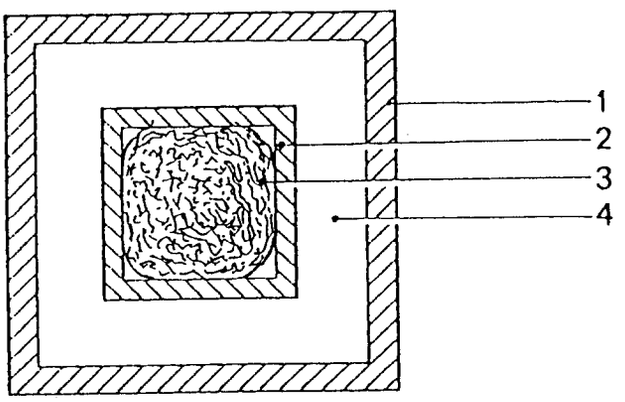


Fig.2

Fig. 3



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EUROPEAN SEARCH REPORT

Application Number

EP 93 20 1042

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	DE-A-3 926 930 (SEYDEL VVGMBH) * column 4, line 48 - line 67; figure 1 *	1,2	D01G1/08
A		5	
A	GB-A-2 163 462 (BARMAG BARMER MASCHINENFABRIK AG) * the whole document *	1	
A	US-A-5 060 545 (KEITH,CH.A.) * column 3, line 15 - column 5, line 40; figures 2,7 *	2,4,5	
A	GB-A-2 174 419 (ASAHI KASEI KOGYO KK)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

D01G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	09 AUGUST 1993	MUNZER E.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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